

**REMARKS**

Claims 1-22 are pending in this application. By this Reply, claim 15 is amended and new claims 20-22 are added. Reconsideration and withdrawal of the rejections are respectfully requested in view of the foregoing amendment and following remarks.

Claims 1-9 and 12 stand rejected under 35 U.S.C. § 102(e) over Kumar et al. (U. S. Patent No. 5,852,389) (hereinafter Kumar). Additionally, although not positively rejected in the Office Action, Applicant believes that claims 13 and 14 are similarly rejected under 35 U.S.C. § 102(e) over Kumar based on paragraph 13 of the Office Action. These rejections are respectfully traversed.

Independent claims 1 and 13 broadly recite features of the preferred embodiment. Kumar fails to disclose all the claimed features, as required by Section 102.

For example, Kumar fails to disclose a vector modulator, including a first amplitude invariant phase shifter to shift a phase of an input signal, a coupler to separate an output of the first amplitude invariant phase shifter into first and second channel signals, a second amplitude invariant phase shifter to shift a phase of the first channel signal, a third amplitude invariant phase shifter to shift a phase of the second channel signal, and a combiner that receives and combines signals from the second and third invariant phase shifters and provides an output, as recited in claim 1.

Additionally, Kumar fails to disclose a vector modulator, including a first amplitude invariant phase shifter for shifting a phase of a received signal at prescribed intervals within a

phase shifting range of approximately  $0\sim 360^\circ$ , a quadrature hybrid coupler for separating an output of the first amplitude invariant phase shifter into I and Q channel signals shifted substantially  $90^\circ$  in phase relative to each other, a second amplitude invariant phase shifter for shifting a phase of the I channel signal by a first amplitude within a phase shifting range of approximately  $0\sim 90^\circ$ , a third amplitude invariant phase shifter for shifting a phase of the Q channel signal by a second amplitude within a phase shifting range of approximately  $0\sim 90^\circ$ , and a combiner for receiving signals from the second and third amplitude invariant phase shifters and calculating a vector sum thereof, as recited in claim 13.

Kumar relates to a direct QAM modulator. Referring to figures 1A and 1B, an RF oscillator 10 provides an input signal to a Lange coupler 11. Typically, Lange couplers are used to provide equal power with quadrature phase splitting. An in-phase output of the coupler 11 is provided to a rat-race coupler 12, while the quadrature output of the coupler 11 is provided to a second rat-race coupler 13. Each of the rat-race couplers generates a 0 degree output and a 180 degree output. The outputs of the first rat-race coupler 12 are provided to a first single pole double throw switch 14 and the outputs of the second rat-race coupler 13 are provided to a second single pole double throw switch 15. The Kumar modulator additionally includes first and second variable phase shifters 18, 19. The first and second variable phase shifters 18, 19 are respectively coupled to receive outputs 35A and 37A of first and second single pole double throw switches 14, 15.

In paragraph 4 of the Office Action, the Patent Office asserts that Kumar discloses a

vector modulator, and directs the Applicant's attention to Figure 1B to support this assertion. Specifically, the Patent Office quotes Kumar's statement that "phase shifters, for example implemented using Lange couplers terminated with varactor diodes, are connected to the output ports of the Lange couplers...." According to Kumar, these phase shifters are shown in Figure 1B as elements 18 and 19. Moreover, although not disclosed by Kumar, the Patent Office asserts that it is inherent for the phase shifter to be amplitude invariant.

Next, the Patent Office asserts that Kumar discloses a coupler in Figure 1A to shift the phase of an input signal. This feature is shown as element 11 from Figure 1A, which receives an input signal from oscillator 10. Additionally, although not disclosed by Kumar, the Patent Office asserts that phase shifters 18, 19 can be coupled to the coupler 11. Thus, the Patent Office asserts that the coupler 11 can be used to separate an output of the first amplitude invariant phase shifter 18.

The Patent Office additionally asserts that Kumar discloses a second amplitude invariant phase shifter (Figure 1B, element 18) and a third amplitude invariant phase shifter (Figure 1B, element 19).

Consequently, Kumar shows only two phase shifters: phase shifter 18 and phase shifter 19. Assuming, *arguendo*, that these phase shifters correspond to the claimed second and third phase shifters, Kumar thus fails to disclose the first phase shifter.

Furthermore, if it is assumed that these phase shifters correspond to the claimed first and second phase shifters, then Kumar fails to disclose a third a shifter. Moreover, it is an invalid

assumption to equate either of the Kumar phase shifters 18, 19 to the first claimed phase shifter. Specifically, neither of the Kumar phase shifters 18, 19 is disclosed to provide an input signal to the coupler 11.

Claims 2-9 and 12 depends from claim 1, in claim 14 depends from claim 13. These dependent claims are allowable for at least the reasons discussed above with respect to the corresponding independent claims. Accordingly, Kumar fails to disclose all of the claimed features, as required by Section 102. Hence, it is respectfully requested that this rejection be withdrawn.

Claim 3 is allowable for additional reasons as well. For example, Kumar fails to disclose that the first amplitude invariant phase shifter delays the input signal by fixed intervals within a first prescribed shifting range of approximately  $0^\circ \sim 360^\circ$ . To support the assertion that Kumar shows this feature, the Patent Office relies on element 11 of Figure 1A, combined with elements 12 and 13. Applicant respectfully submits that elements 11-13 are couplers, and are not phase shifters. Additionally, based on the Patent Office's analysis of claim 1, if, *arguendo*, a first phase shifter is even shown, it is one of element 18 and element 19 shown in Figure 1B. Neither of these phase shifters is disclosed to have a shifting range of approximately  $0^\circ \sim 360^\circ$ . Consequently, for at least this additional reason, claim 3 is allowable over Kumar.

Claim 8 stands rejected under 35 U.S.C. § 103(a) over Kumar. This rejection is respectfully traversed.

Claim 8 depends from claim 1. As discussed above, Kumar fails to teach or suggest all

of the claimed features. Consequently, a prima facie case of obviousness cannot be made. Withdrawal of this rejection is thus respectfully requested.

Claims 15 and 19 stand rejected under 35 U.S.C. § 102(b) over Belcher et al. (U.S. Patent No. 5,760,646) (hereinafter Belcher). This rejection is respectfully traversed.

Claims 15 broadly recites features of the preferred embodiment, and has been amended to more particularly recite features of the preferred embodiment. Consequently, Belcher fails to disclose all of the claimed features, as required by Section 102.

For example, Belcher fails to disclose a circuit for a high power amplifier including, inter alia, a delay to delay the second signal by a prescribed time period, and a fast phase-amplitude controller to compare amplitudes and phases of the reference signal and the delayed second signal to provide the control signal. Although the Patent Office asserts that some delay is inherent for various components, Belcher fails to disclose an actual delay circuit. Additionally, the inherent delay is a random delay, and is therefore not a delay for prescribed time period. Consequently, Belcher fails to disclose all the claimed features as required by Section 102.

Claim 19 depends in claim 15, and is allowable for at least the reasons discussed above with respect to claim 15. Consequently, withdrawal of this rejection is respectfully requested.

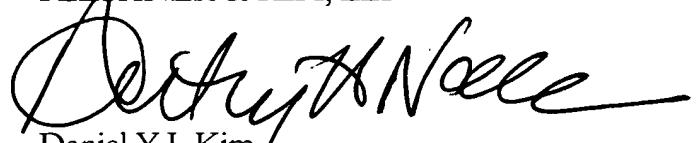
New claims 20 - 22 have been added and are believed to be in condition for allowance. For example, claim 20 depends from claim 1 and claims 20 and 22 depend from claim 13. Examination and allowance in due course are earnestly solicited.

**CONCLUSION**

In view of the foregoing amendments and remarks, it is respectfully submitted that the application is in condition for allowance. If the Examiner believes that any additional changes would place the application in better condition for allowance, the Examiner is invited to contact the undersigned attorney, **Anthony H. Nourse**, at the telephone number listed below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this, concurrent and future replies, including extension of time fees, to Deposit Account 16-0607 and please credit any excess fees to such deposit account.

Respectfully submitted,  
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Amended Claims With Mark-ups to Show Changes Made

15. (Amended) A circuit for a high power amplifier, comprising:

- a divider to divide an input signal into a first signal and a second signal;
- a vector modulator to receive the first signal and a control signal and output a vector modulated signal;
- an amplifier to amplify the vector modulated signal;
- a directional coupler to receive a signal from the amplifier and generate a reference signal; [and]
- a delay to delay the second signal by a prescribed time period; and
- a fast phase-amplitude controller to compare amplitudes and phases of the reference signal and the delayed second signal [delayed for a prescribed time period,] to provide the control signal.